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19th Part of No. AAEE/868

MINISTRY OF SUPPLY

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT

BOSCOMBE DOWN

VENOM FB. MK.1 WE.256
(GHOST 3)

HOOD JETTISON TESTS IN THE BLOWER TUNNEL

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19th Part of Report No. AAEE/868

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN

11. DEC. 1953

Venom FB. Mk.1 WE.256
(Ghost 3)

Hood Jettison Tests in the Blower Tunnel

A. & A.E.E. Ref: AAEE/6225/T/28/MJJ.
Period of Test : 19.9.52 to 26.9.52.

Progress of issue of Report

Report No.	Title
14th Part AAEE/868	WE.257,258, 259 and 260 Consistency of Stalling and High Mach Number Characteristics of Production Venom FB.1 Aircraft.
15th - do -	WE.259 Engineering Appraisal.
16th - do -	WE.258 Service Clearance Trials of Mk.8 Type 17 WE.259 R.P. Installation
17th - do -	WE.258 Handling with 8 x 60 lb. Head R.P.'s. WE.259
18th - do -	WE.259 Intensive Flying Trials.

Summary

The jettison characteristics of the Venom F.B. Mk.1 hood are satisfactory in the Blower Tunnel at speeds between 110 and 300 knots, and they should be satisfactory in flight provided that:-

(a) The hood does not break up too early on release.
(b) The hood seal is deflated (for low speed jettison).
(c) The winding handle is set in accordance with S.T.I. Venom/7A and that the stop plate is rigged to give not more than one diameter clearance between the pin and the locking plate.

Although the hood broke up when jettisoned at 110 knots and 300 knots without causing any damage, there can be no assurance that all hoods will break up in the same manner. It is therefore recommended that the hood be strengthened to prevent it breaking up when jettisoned in flight. The provision of an automatic hood seal deflation valve is desirable.

This report is issued with the authority of

Air Commodore,
Commanding, A. & A.E.E.

/Introduction.....

1. Introduction

Tests were required to assess the jettison characteristics of the Venom F.B. Mk.1 hood and the possibility of injury to the pilot, or damage to the aircraft in the event of an emergency jettison being made in flight.

2. Description of the hood and jettison mechanism

2.1. The hood was of "tear drop" form, constructed of a single skin of transparent material, the forward ends of the lower edges being of light alloy. It weighed approximately 40 lb., was 4 ft. 3 ins. long, 1 ft. 6 ins. high, and 2 ft. wide. The hoods used for these tests were not fitted with fibreglass edges.

2.2. The hood slid fore and aft on rollers attached to the hood and engaging in the hood rails and latches. The latch rails were located laterally by eight latch pegs, fore and aft by the latch rail operating levers, and vertically by the latch tongues. The port and starboard latch rail operating levers were connected by two vertical push-pull rods, two bellcranks, and a cross push-pull rod. A spring was attached to each bellcrank to hold the latch rails in the engaged position. The re-setting cable was attached to the port bellcrank, and the pilot's operating cable to the starboard bellcrank. There was a hinge in the rear metal fairing. This consisted of two overlapping flanges, one attached to the fuselage, and one attached to the hood. The vertical clearance between these flanges when the hood was fitted should not exceed 0.1 ins., and the horizontal overlap should be at least 0.3 ins. There was also a lead weight built into this rear fairing.

2.3. When the jettison handle, situated on the starboard coaming, was pulled the operating cable moved the bellcranks, until the springs attached to them were overcentred. The springs then took over, and moved the bellcranks to their maximum travel. The bellcranks pulled down on the vertical push-pull rods, which in turn moved the latch rail operating levers. This slid the latch rails back until the tongues were disengaged. The hood was then free to lift at the front end and hinge about the rear flange plate until the overlapping flanges were disengaged.

2.4. The hood seal had to be deflated manually by turning a cock situated adjacent to the jettison lever.

2.5. Fig. 1 shows details of the hood jettison mechanism.

3. Conditions and results of tests

3.1. The aircraft was placed in front of the Blower Tunnel in the flight attitude for the test airspeed, the tunnel being set level, and in the best position to direct the airflow over, and around the aircraft hood.

3.2. A guard was built around the tail to protect it from possible damage.

3.3. All tests were made with slings fitted to the hood to enable it to be rescued, and used for more than one test.

3.4. Details of the tests carried out and the results obtained are given in Appendix A.

3.5. Tests 1 to 6 were made using the 6 ft. diameter nozzle, and tests 7 and 8 were made with the 4 ft. diameter nozzle fitted to the Blower Tunnel.

3.6. High speed cine records of all the tests were made from the beam, and upper frontal positions, the beam view record incorporating a spark time base on the film, and an indicator showing the exact instant at which the jettison handle was pulled.

/3.7.....

3.7. Fig. 2 shows the general view of the layout with the aircraft prepared for the tests.

3.8. Figs. 3 to 8 show several positions of the hood on being jettisoned and the time taken to assume these positions from the instant of pulling the jettison handle.

3.9. The load to operate the jettison handle was measured and found to be approximately 20 lb., with no aerodynamic loads applied.

3.10. The pressures within the cockpit, with the hood closed, were recorded at both 110 knots and 300 knots and there was no change from static.

4. Criticisms of the jettison mechanism

4.1. The jettison mechanism was very simple, easy to re-set and should require little maintenance in service.

4.2. No automatic hood seal deflation valve is fitted. As it is essential that the hood seal be deflated to ensure a successful jettison at slow speed, the pilot has first to deflate the hood seal before he can jettison the hood. This increases the delay in abandoning the aircraft, and is an action which may be overlooked in an emergency.

5. Conclusions

5.1. The hood will jettison safely in flight at speeds between 110 knots and 300 knots providing that it does not break up too early after release.

5.2. Small angles of yaw do not adversely affect the jettison characteristics.

5.3. The hood will not jettison at 110 knots with the hood seal inflated.

5.4. The hood will not jettison at 110 knots if the winding handle is incorrectly rigged, and the handle is overtight on the stop plate.

6. Recommendations

6.1. Strengthening of the hood to ensure that it will not break up when jettisoned in flight is desirable.

6.2. The provision of an automatic hood seal deflation valve is desirable.

6.3. It is important that the fit of the flange plate hinge should be maintained strictly in accordance with servicing instructions.

6.4. The winding handle must be set in accordance with S.T.I. Venom/7A, and the stop plate rigged to give not more than one diameter clearance between the pin and the locking plate.

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/Appendix 'A'.....

Appendix 'A'

α = Angles of wing chord to airflow. θ^{o} = Angle of hood pitching before release from hinge flange.

Test	Speed	α °	Yaw	Hood Seal Pressure	Condition of hood.	θ^{o}	Remarks	Fig. No.
1	110 knots	+10°	Zero	Zero	No safety strut fitted.	8°	The hood broke up immediately on release. Subsequent examination showed that the rear flange hinge had torn at the welded joint. This break up may have been due to insufficient clearance between the two faces of the flanged hinge. For the remainder of the tests, this point was carefully checked.	3
2	110 knots	+10°	Zero	7 p.s.i.	Safety strut fitted. Rearmost tongue removed from the latch rails.	N.A.	The hood failed to leave the aircraft.	N.A.
3	110 knots	+10°	Zero	Zero	As for test 2.	21°	The hood left the aircraft, and passed high over the tail.	4
4	110 knots	+10°	Zero	Zero	As for test 2.	N.A.	The hood failed to leave the aircraft. Investigation showed that the hood winding handle had been set to give more than one diameter clearance between the pin and the locking hole.	N.A.
5	110 knots	+10°	Zero	Zero	As for test 2.	20°	The hood winding handle was set to give one diameter clearance between the pin and the locking hole. The hood left the aircraft and passed high over the tail.	5
6	110 knots	+10°	10° to Port	Zero	As for test 2, except that the hood winding handle was set as per S.T.I. Venom/7A.	17°	The hood passed high over the tail.	6
7	300 knots	+2°	Zero	7 p.s.i.	As for test 6.	16°	As for test 6.	7
8	300 knots	+2°	6° Yaw to port.	Zero	As for test 6.	9°	Shortly after the hood left the aircraft, it broke up.	8

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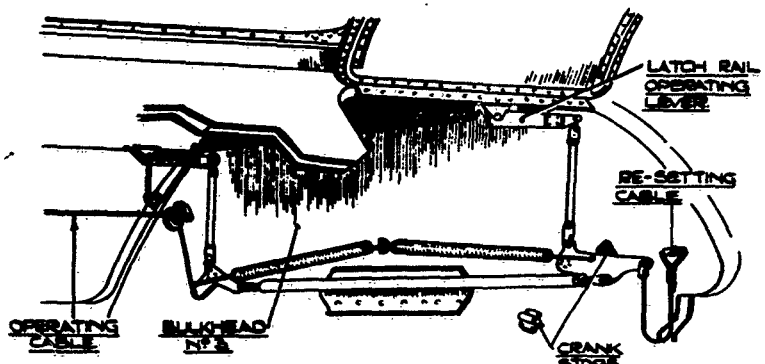
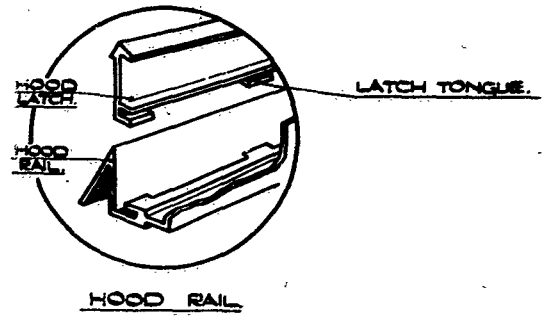
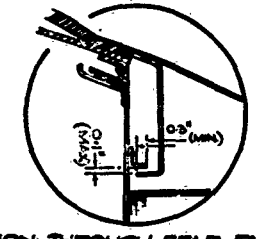
DETAILS OF HOOD MECHANISM.



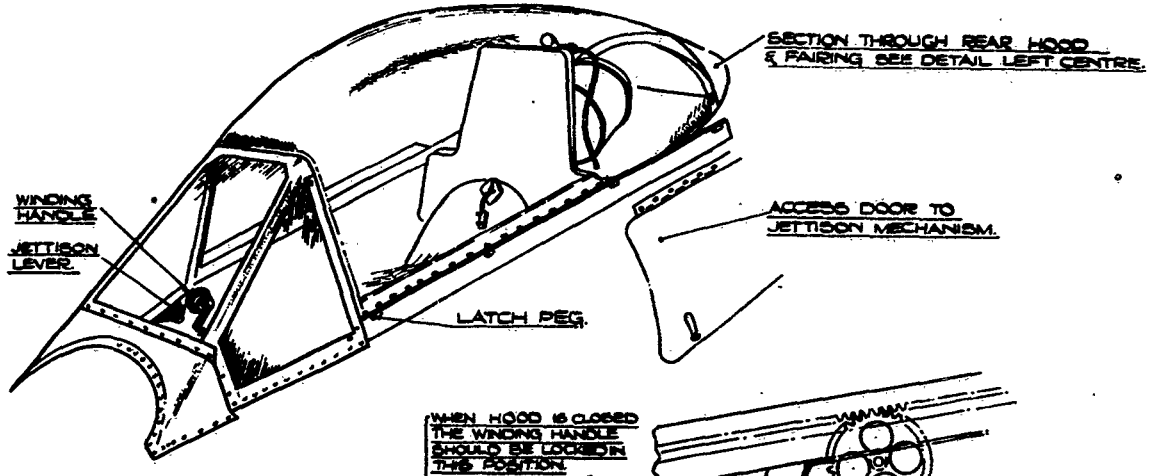
JETTISON MECHANISM.

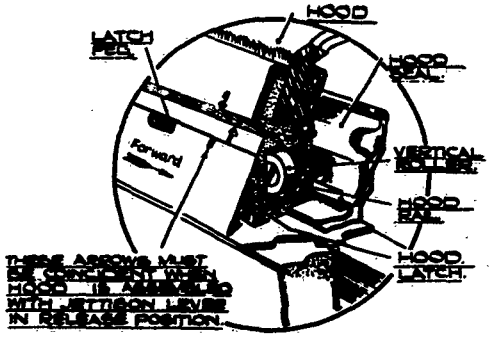


HOOD RAIL.

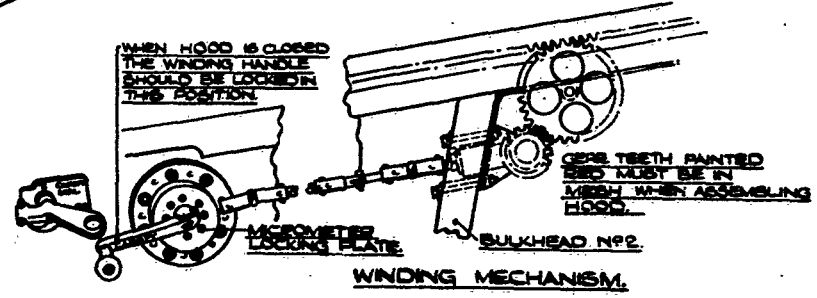


SECTION THROUGH REAR FAIRING.





SECTION THROUGH HOOD IN LOCKED POSITION.



WINDING MECHANISM.

FIG. 1.

FIG.2.

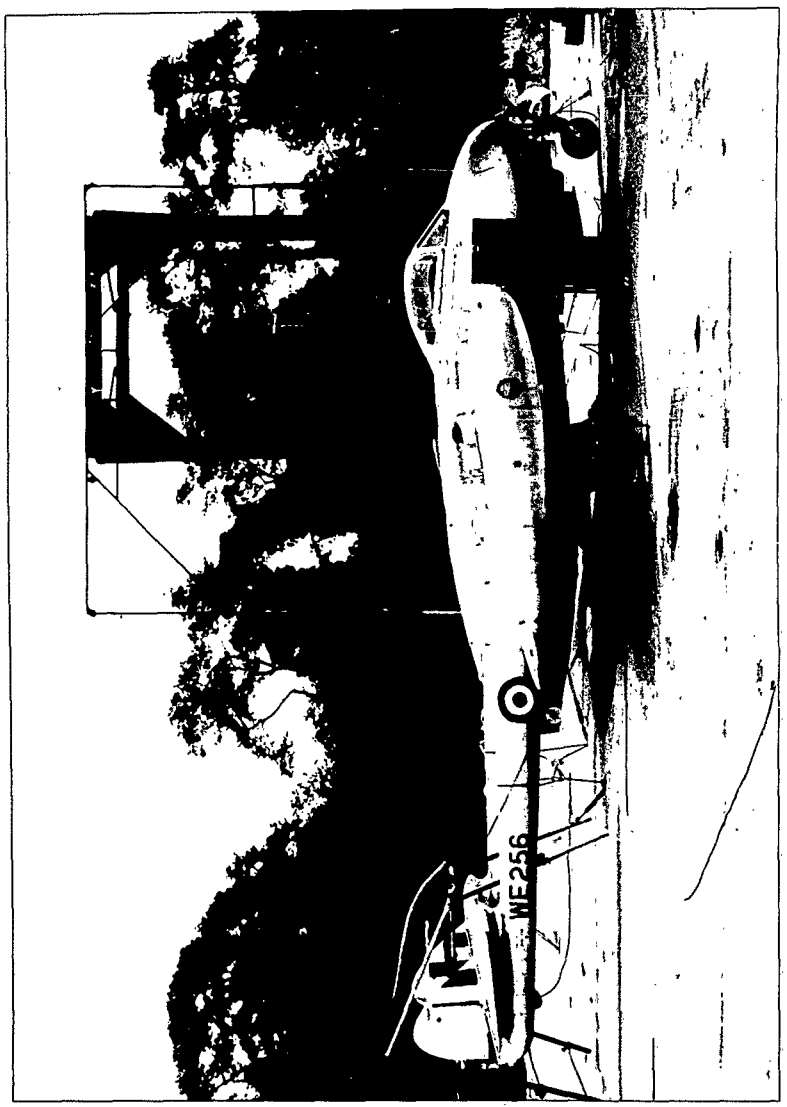


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FIG.3&4.

FIG. 3. TEST. 1.
110 KNOTS. NO YAW.

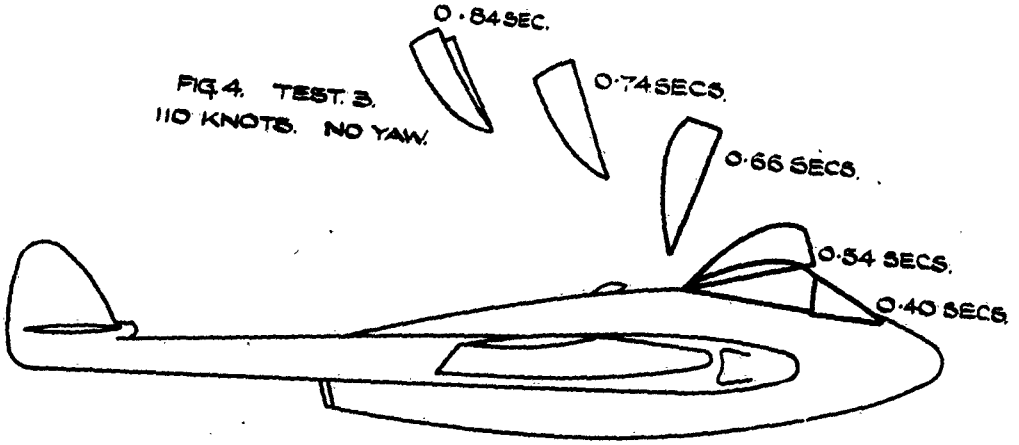

FIG. 4. TEST. 2.
110 KNOTS. NO YAW.

HOOD JETTISON TESTS.

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FIG. 5 & 6.

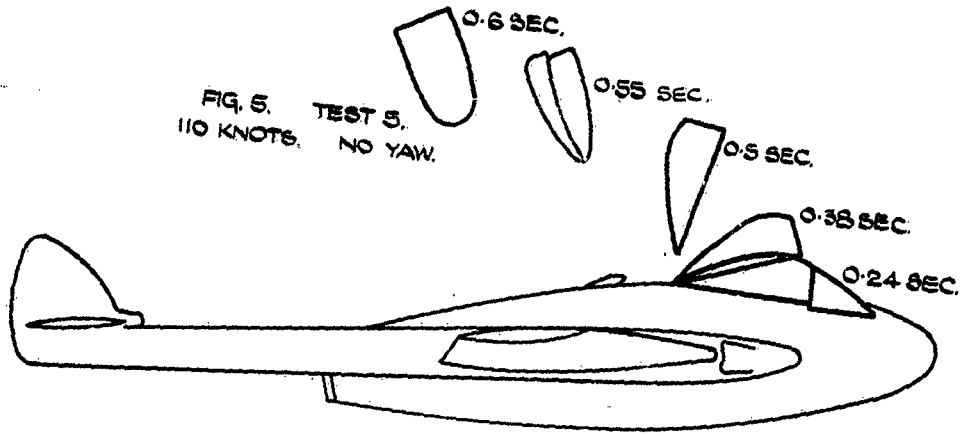

FIG. 5. TEST 5.
110 KNOTS. NO YAW.

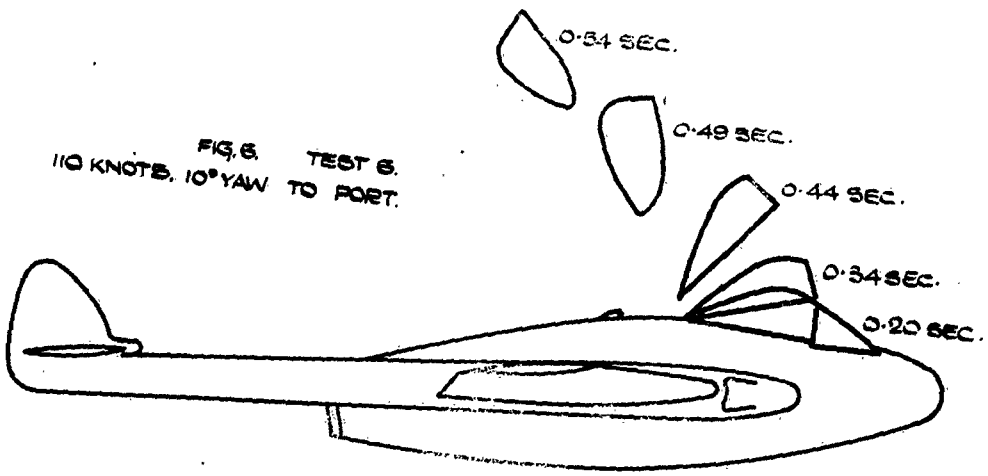

FIG. 6. TEST 6.
110 KNOTS. 10° YAW TO PORT.

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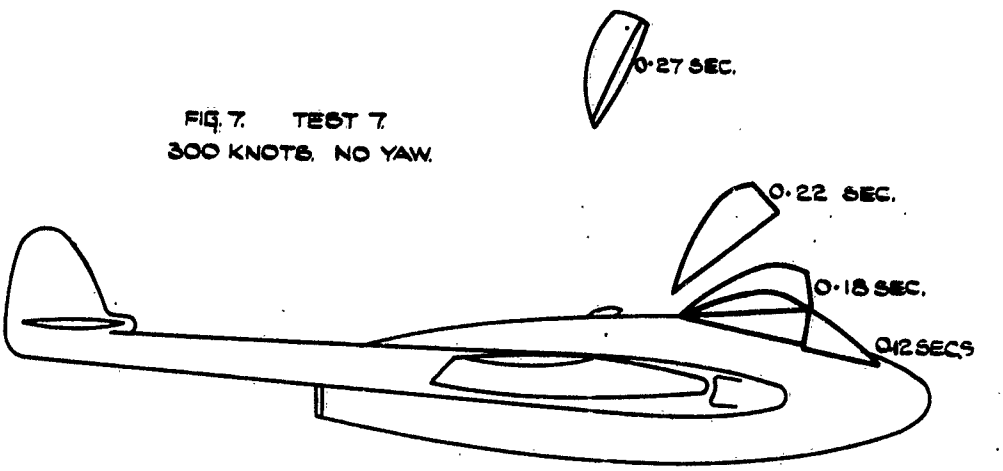

FIG. 7. TEST 7.
300 KNOTS. NO YAW.

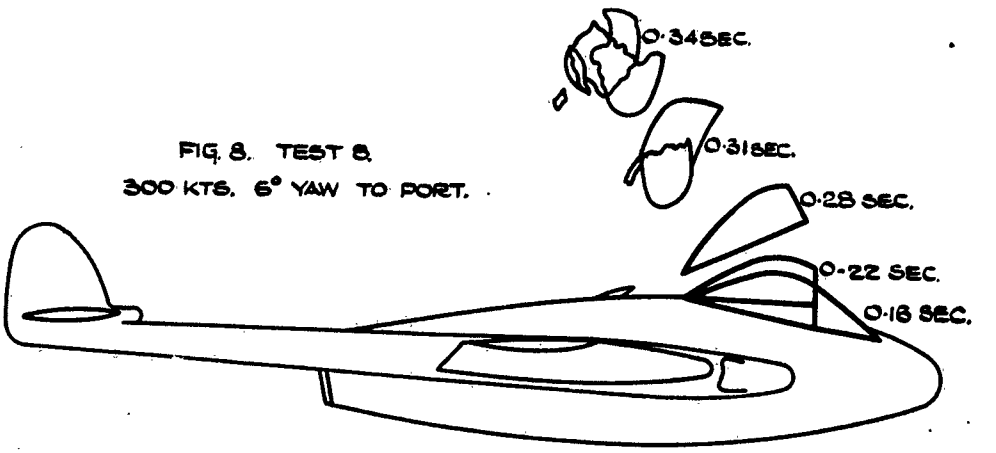

FIG. 8. TEST 8.
300 KTS. 6° YAW TO PORT.

HOOD JETTISON TESTS.

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